Ghana - EFOT (ECG)

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Overview

Identification

COUNTRY
Ghana

EVALUATION TITLE
EFOT (ECG)

EVALUATION TYPE
Independent Evaluation

ID NUMBER
DDI-MCC-GHA-IE-ENERGY-EFOT-2019-v01

Version

VERSION DESCRIPTION
- v01: Edited, anonymous dataset for public distribution.

Overview

ABSTRACT
The ECG Financial and Operational Turnaround (EFOT) Project is designed to improve ECG's management and efficiency by introducing a private sector operator through a concession agreement, reducing outages and commercial and technical losses, and strengthening the distribution system. With a budget of nearly $340 million, EFOT is the largest project in the compact. The five main EFOT activities include: ECG Private Sector Participation (PSP) activity, Modernizing ECG Operations activity, ECG Commercial Loss Reduction activity, ECG Technical Loss Reduction activity, and ECG Outage Reduction activity. The performance evaluation of this project will focus on assessing the project's implementation, progress toward achieving outcomes, and longer-term sustainability, including financial and grid-based outcomes. Within the EFOT project, we will investigate the utility's financial and operational performance, investments in infrastructure maintenance and improvement, electricity supply quality and reliability, cost of service delivery, losses (technical, commercial, and collections), and the utility's ability to serve as a credible off-taker under power purchase agreements (PPAs). We designed the performance evaluation of EFOT to address questions that fall into three broad categories: project objectives, implementation, and sustainability of the project. Implementation questions focus on the quality, fidelity, and timing of project implementation. Project objectives questions focus on whether the outcomes captured in the program logic were achieved, assuming the project was implemented according to plan. The sustainability questions delve into the long-term viability and longevity of these outcomes. Evaluation questions include: 1. Did the private sector operator result in improved reliability of power and improved financial health of the utility? 2. To what extent did the activities improve operational efficiency and the cost of distributing power? Is it possible to identify which interventions are the most effective? 3. Did technical and commercial losses, power quality, and reliability improve? Do stakeholders perceive that these changes resulted from compact investments versus other investments or policy changes? 4. Were projects activities implemented as designed? How did implementation (in terms of objectives, activities and beneficiaries) deviate from the original logic driving the investment, and why? How did changes in implementation affect project performance? What were the implementation successes and challenges? Did the PSP transaction reach financial close by the required deadline (end of Year 2 of the Compact)? Was a qualified firm identified, recruited, and brought on board who could improve ECG's financial and operational performance by end of Year 2? What are the lessons learned from the process? 5. Did the private sector operator leverage its own resources to make appropriate upgrades to the distribution system? 6. How did the new management information systems and the other foundational investments affect the operational efficiency and cost of distributing power for the utility? 7. Did the semiannual review process or other high-level stakeholder engagement contribute to progress on key reform milestones and outcomes? If so, how? 8. Were improvements in project outcomes sustained after the end of the compact? What sustainability planning was done during implementation, and why? What are the critical institutional factors that affected their sustainability? 9. Did the financial health of the utility stabilize over the life of the compact and after the compact was finished? Were improvements driven primarily by tariff increases or by other project activities? If there are no improvements or improvements are minimal, why?

EVALUATION METHODOLOGY

pre-post, other (performance evaluation)

UNITS OF ANALYSIS
Individuals, households, enterprises, administrative units

TOPICS

Topic	Vocabulary	URI
Energy	MCC Sector	

KEYWORDS
Ghana, Ghana compact, power, energy, electricity, power sector reform, ecg, outages, PPAs, NEDCo, IPPs

Coverage

GEOGRAPHIC COVERAGE
ECG distributes the majority of Ghana's electricity—around 70 percent—to six administrative regions in southern and central Ghana: Greater Accra, Western, Ashanti, Central, Volta, and Eastern regions.

UNIVERSE
The performance evaluation of the EFOT project will rely primarily on data produced by the projects and the utilities. These include implementation records and administrative data, such as planning documents, engineering reports, financial statements, and indicators related to power reliability. In addition, the evaluation will rely heavily on key informant interviews with program decision makers and those involved in implementation, as well as complementary secondary data sources and the household and enterprise survey.

Producers and Sponsors

PRIMARY INVESTIGATOR(S)

Name	Affiliation
Mathematica	

FUNDING

Name	Abbreviation	Role
Millennium Challenge Corporation	MCC	

Metadata Production

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Name	Abbreviation	Affiliation	Role
Mathematica			Independent Evaluator

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MCC Compact and Program

COMPACT OR THRESHOLD
Ghana II Compact

PROGRAM

The Ghana II Compact aims to improve the quality and reliability of power distribution systems; support regulatory reforms to promote private sector partnership and long-term financial sustainability; improve access to legal connections for micro, small, and medium-sized enterprises (MSMEs); and promote energy efficiency to manage demand growth. The compact comprised the four following projects designed to address critical challenges facing the electricity sector: (1) the ECG Financial and Operational Turnaround Project (EFOT), which was designed to improve ECG's management and efficiency by introducing private sector participation, reducing outages and commercial and technical losses, and modernizing the electricity distribution system; (2) the Regulatory Strengthening and Capacity Building Project, designed to promote sustainability, transparency, and accountability in the power sector through strengthening regulatory institutions and processes, reviewing and restructuring tariffs, and improving the environment for private sector investment; (3) the Access Project, which targets MSMEs in markets and economic enclaves in urban and peri-urban areas with activities to increase legal connections and improve security lighting; and (4) the Energy Efficiency and Demand Side Management (EEDSM) Project, which seeks to improve building and appliance efficiency and reduce energy wastage through energy audits; standards and labels for energy efficient devices; upgrades to street lighting; and education and public information activities. The original design of the compact also covered the NEDCo Financial and Operational Turnaround Project (NFOT) which was designed to improve NEDCo's financial performance and customer service through private sector involvement in operational and commercial capacity building, infrastructure investments, and efforts to improve cost recovery. MiDA was not able to reach an agreement to move forward with this project, so it was de-scoped. Consequently, the funds are being reallocated, and we do not cover the project in this design report. The original design of the compact also included the Power Generation Sector Improvement (Generation) Project to diversify fuel sources for power generation through support for the gas sector and liquefied natural gas development and to strengthen the enabling environment for independent power producers (IPPs). The need for MCC assistance has been greatly reduced because the GoG is already undertaking reforms with support and technical assistance from USAID. As a result, MCC is not moving forward with this project and we do not cover it in this report.

MCC SECTOR

Energy (Energy)

PROGRAM LOGIC

MCC's problem diagnostic identified two main issues limiting the efficiency and effectiveness of the Ghana energy sector: (1) low reliability of electricity supply and (2) insufficient access to power. The program logic for the Ghana II Compact addresses these issues. The activities are expected to achieve targeted power sector outcomes of increased availability, reliability, and expansion of cost-effective generation for all utility customers and increase the number of businesses, institutions, and households connected to the grid. The core compact activities consist of four main projects; the ECG Financial and Operational Turnaround Project, the Regulatory Strengthening and Capacity Building Project, the Energy Efficiency and Demand Side Management Project, and the Access Project. Together, these projects aim to reduce or eliminate sector inefficiencies and reliance on government subsidies, improving service as a result. If successful, these projects would improve the availability and quality of electricity to consumers while also improving the financial health of the utility. Outcomes from these activities support the Compact's goal of reducing poverty through sustainable and equitable economic growth by improving Ghana's power sector. The EFOT project is designed to improve ECG's management and efficiency by introducing a private sector operator through a concession agreement, reducing outages and commercial and technical losses, and strengthening the distribution system. ECG distributes the majority of Ghana's electricity—around 70 percent—to six administrative regions in southern and central Ghana: Greater Accra, Western, Ashanti, Central, Volta, and Eastern regions. With a budget of nearly $340 million, EFOT is the largest project in the compact. The five main EFOT activities include: ECG Private Sector Participation (PSP) activity, Modernizing ECG Operations activity, ECG Commercial Loss Reduction activity, ECG Technical Loss Reduction activity, and ECG Outage Reduction activity.

PROGRAM PARTICIPANTS

The primary EFOT beneficiaries are customers in the ECG catchment area as well as their household members, enterprise employees, and enterprise customers.

Sampling

Study Population

The performance evaluation of the EFOT project will rely primarily on data produced by the projects and the utilities. These include implementation records and administrative data, such as planning documents, engineering reports, financial statements, and indicators related to power reliability. In addition, the evaluation will rely heavily on key informant interviews with program decision makers and those involved in implementation, as well as complementary secondary data sources and the household and enterprise survey.

Sampling Procedure

We will conduct a longitudinal household and enterprise survey that covers the Greater Accra area as well as the next largest 7 cities in the ECG catchment area. The survey will cover both households and enterprises. We will work closely with GridWatch to ensure that our sample targets locations where they are collecting outage data, when possible, and so that we can avoid surveying the same households and enterprises covered in their baseline survey. We will work with Ghana Statistical Service (GSS) and the World Bank to develop two sampling frames-one for households and one for businesses. We will use a multi-stage sampling plan. First we will sample enumeration areas. Second, we will sample electric poles within enumeration areas. Third, we will sample households and enterprises served by those poles. We will oversample larger enterprises to improve the precision of our data for addressing the Economic Rate of Return calculations. We will conduct Key Informant Interveiws and Focus Group Discussion to help enrich our understanding of key issues. The evaluation will have three rounds of data collection, baseline in 2019, a qualitative midline in 2021 near the end of the compact, and an endline starting in 2023. We propose a single household and enterprise survey at baseline and endline that will cover all project activities that we are evaluating. See Estimates of Sampling Error section below for a description of our estimated statistical power.

Overall, with a planned sample size of 2,394 enterprises in the Greater Accra area, we are estimating a minimum detectable effect (MDE) of 0.12 standard deviations for enterprises. The minimal detectable differences (MDD) are about half as large as the MDE for binary outcomes such as, whether the entity has a legal connection. This outcome had a mean of around 0.5 in the baseline data for the Access project. This means that we should be able to detect changes in the fraction of enterprises with a legal connection as small as 0.06 between the baseline and follow-up surveys. Given MCC's greater interest in enterprises compared to households we are aiming for a much larger MDE for households, at around 0.21. We are expecting to have slightly larger MDEs, of about 0.24 standard deviations, when considering samples of enterprises from smaller geographic areas-in particular when looking only at the geographic areas targeted by one of the following interventions: new substations, bulk supply points, or line bifurcation. We will be able to address the possibility of spillover within the Greater Accra area somewhat more precisely as we expect an MDE of 0.15 for enterprises there. We will have just a bit less precision when looking at enterprises in the 7 largest cities in the ECG catchment area outside of Greater Accra, where we expect an MDE of around 0.17. This will enable us to say something about the degree to which PDS has impacts in areas where the MCC infrastructure is less likely to have made a difference. As noted above, we plan to coordinate with GridWatch so that we can obtain outage and voltage fluctuation data based on the PowerWatch devices for our survey samples in the Greater Accra area. We expect that this will require approximately 798 PowerWatch devices for the enterprise surveys and another 150 for the household surveys for a total of 948 PowerWatch devices. This is based on an assumption that we will have one transformer per EA and three PowerWatch devices per transformer. In doing these calculations we have assumed no overlap between the transformers used for the household and enterprise surveys. In reality, we expect that there will be some overlap which may enable us to add additional EAs and thereby further reduce our MDIs; however, if the number of devices available are near the estimated required number of 948, we recommend deploying them all appropriately between households and enterprises to help improve our ability to capture outages and voltage fluctuations. See Table X.2. in the EDR for more details.

Deviations from Sample Design

Not applicable for evaluation design report.

Response Rate

Not applicable for evaluation design report.

Weighting

Not applicable for evaluation design report.

Questionnaires

No content available

Data Collection

Data Collection Dates

Start	End	Cycle

Data Collection Notes

Unknown because data has not yet been collected.

Supervision

Unknown because data has not yet been collected.

Data Processing

Data Editing

Unknown because data has not yet been collected.

Other Processing

Unknown because data has not yet been collected.

Data Appraisal

Estimates of Sampling Error

Not applicable for evaluation design report.